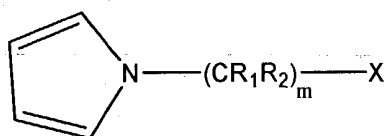


## WHAT IS CLAIMED IS:

1. A method for preparing an in situ telechelic polymer functionalized by having a heteroatomic chain end group, comprising quenching a cationic living polymer product or a terminal *tert*-chloride chain end of a carbocationic quasiliving polymer product in the presence of a Lewis acid, with an N-substituted pyrrole of formula I



formula I

wherein:

$R_1$  and  $R_2$  are independently in each  $-(CR_1R_2)-$  unit selected from the group consisting of hydrogen and alkyl from  $C_1$  to  $C_6$  carbon atoms;

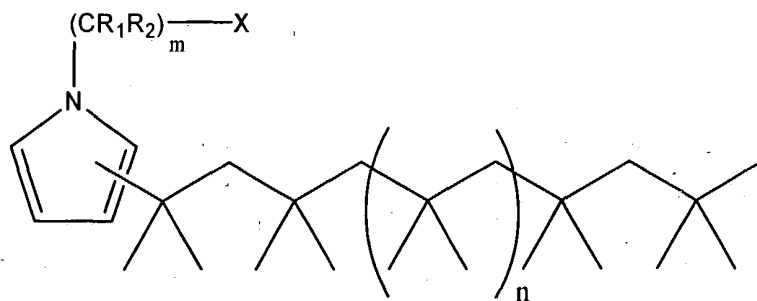
$m$  is an integer from 1 to 20; and

$X$  is selected from the group consisting of hydrogen, alkyl, aryl, alkaryl, alkoxy, heteroaryl, nitro, ureido,  $-OC(O)R_3$ ,  $-C(O)R_4$ ,  $-C(O)OR_5$ ,  $-C(O)NR_6R_7$ ,  $-P(R_8)_3$ ,  $-P(OR_9)_3$ ,  $-SR_{10}$ ,  $-OSO_3R_{11}$ , and  $-S(O)R_{12}$ ; wherein  $R_3$  is alkyl or alkenyl; and  $R_4$ ,  $R_5$ ,  $R_6$ ,  $R_7$ ,  $R_8$ ,  $R_9$ ,  $R_{10}$ ,  $R_{11}$ , and  $R_{12}$  are alkyl.

2. The method of Claim 1, wherein the quasiliving polymer product is formed by contacting at least one cationically polymerizable monomer with an initiator, in the presence of a Lewis acid and solvent under suitable quasiliving polymerization reaction conditions.
3. The method of Claim 2, wherein said initiator is multifunctional.
4. The method of Claim 2, wherein said initiator is bifunctional.
5. The method of Claim 2, wherein said initiator is monofunctional.

6. The method of Claim 5, wherein the initiator is selected from the group consisting of 2-chloro-2-phenylpropane; 2-acetyl-2-phenylpropane; 2-propionyl-2-phenylpropane, 2-methoxy-2-phenylpropane, 2-ethoxy-2-phenylpropane, 2-chloro-2,4,4-trimethylpentane, 2-acetyl-2,4,4-trimethylpentane, 2-propionyl-2,4,4-trimethylpentane, 2-methoxy-2,4,4-trimethylpentane, and 2-ethoxy-2,4,4-trimethylpentane.
7. The method of Claim 2, wherein the at least one cationically polymerizable monomer is selected from the group consisting of isobutene, 2-methyl-1-butene, 3-methyl-1-butene, 4-methyl-1-pentene, and beta-pinene.
8. The method of Claim 7, wherein the at least one cationically polymerizable monomer is isobutylene.
9. The method of Claim 2, wherein two different cationically polymerizable monomers are employed.
10. The method of Claim 1, wherein the molecular weight distribution of the polymer  $M_w/M_n$  is less than 1.5.
11. The method of Claim 1, wherein the N-substituted pyrrole of formula I is one wherein m is an integer from 1 to 6.
12. The method of Claim 1, further comprising contacting the functionalized polymer produced by quenching the quasiling carbocationic living polymer and N-substituted pyrrole with a hydrogenation agent under reactive conditions.
13. The product produced according to the method of Claim 1.

14. A compound of the formula:



wherein:

$R_1$  and  $R_2$  are independently in each  $-(CR_1R_2)-$  unit selected from the group consisting of hydrogen and alkyl from  $C_1$  to  $C_6$  carbon atoms;

$m$  is an integer from 1 to 20; and

$X$  is selected from the group consisting of hydrogen, alkyl, aryl, alkaryl, alkoxy, heteroaryl, nitro, ureido,  $-OC(O)R_3$ ,  $-C(O)R_4$ ,  $-C(O)OR_5$ ,  $-C(O)NR_6R_7$ ,  $-P(R_8)_3$ ,  $-P(OR_9)_3$ ,  $-SR_{10}$ ,  $-OSO_3R_{11}$ , and  $-S(O)R_{12}$ ; wherein  $R_3$  is alkyl or alkenyl; and  $R_4$ ,  $R_5$ ,  $R_6$ ,  $R_7$ ,  $R_8$ ,  $R_9$ ,  $R_{10}$ ,  $R_{11}$ , and  $R_{12}$  are alkyl; and

$n$  is an integer from 0 to 2000.

15. The compound of Claim 14, wherein  $R_1$  and  $R_2$  are hydrogen.
16. The compound of Claim 15, wherein  $m$  is an integer from 1 to 4.
17. The compound of Claim 16, wherein  $X$  is hydrogen.
18. The compound of Claim 16, wherein  $X$  is heteroaryl selected from the group consisting of furan, thiophene, and pyridine.
19. The compound of Claim 16, wherein  $X$  is  $-OC(O)R_3$ , and  $R_3$  is alkenyl selected from the group consisting of ethenyl, *n*-propenyl, and *iso*-propenyl.

20. The compound of Claim 14, wherein n is an integer from 2 to 500.
21. The Compound of Claim 20, wherein n is an integer from 3 to 260.
22. The compound of Claim 14, wherein the pyrrole is 2-substituted.
23. The compound of Claim 14, wherein the pyrrole is 3-substituted.
24. A fuel composition comprising a major amount of hydrocarbons boiling the gasoline or diesel range and an effective detergent amount of a compound of Claim 14.
25. The fuel composition according to Claim 24, wherein the molecular weight of the compound is in the range of from about 500 to 5,000.